Universal tool microscope automatic control research based on Labview

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Abstract—With Shanghai optical instrument factory manufacturing 19 ja universal tool microscope based on the automation transformation, image acquisition from the human eye on reticle m word line reading converted to CCD camera technology in image, by the analysis of image data processing software. Using Labview as PC and single chip microcomputer as the machine and realize the upper machine and lower machine communication, thus to drive the stepper motor. Achieve image automatic acquisition and processing of data analysis, in order to realize the automatic control of universal tool microscope.
Keywords-19 ja universal tool microscope; LABVIEW; Communication; Stepping motor automatic control

I. Introduction

Universal tool microscope is a kind of widely used, high accuracy, low failure rate of precision measuring instruments, with the progress of science and technology, universal tool microscope show full manual detection efficiency is not high, use the shortcomings such as visual reading cause human error is bigger. In order to improve the measurement efficiency and accuracy of measurement, X Y be mounted to the grating ruler and driven by stepping motor, using the Labview software programming and design to achieve accurate measurement. Ease of Use

II. A CONTROL PRINCIPLE OF STEPPER MOTOR

Stepping motor control system is implemented by a computer, its control system principle block diagram is shown in figure 1:
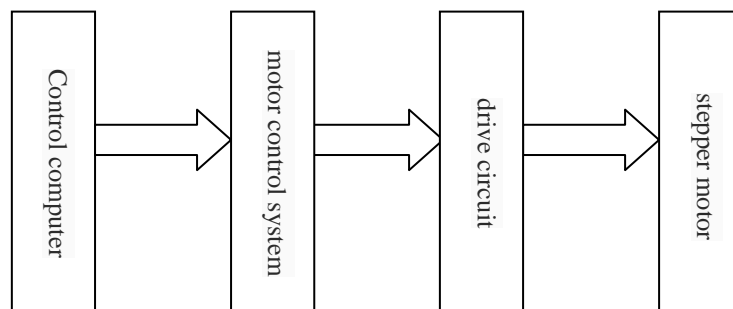

Figure.1 computer control stepping motor system principle block diagram

In the control system, control computer through the control program of MCU send control commands, and single-chip microcomputer according to the control instruction to the stepper motor for temporal pulse sequence is used to control the stepping motor rotation parameters. Is when stepping motor is a pulse signal, and then follow the direction of the temporal pulse determined step.The hardware part is mainly based on single chip microcomputer control circuit, software part is based on the Labview development of motor control program and image processing, etc.

III. STEPPING MOTOR CONTROL SYSTEM HARDWARE

A. *Motor control system*

AT89C51 single-chip microcomputer, used to receive the computer output instruction, at the same time transfer control instruction for temporal pulse is sent to the stepper motor, the rotation of the stepper motor control. Of stepper motor control block diagram is shown in figure 2.
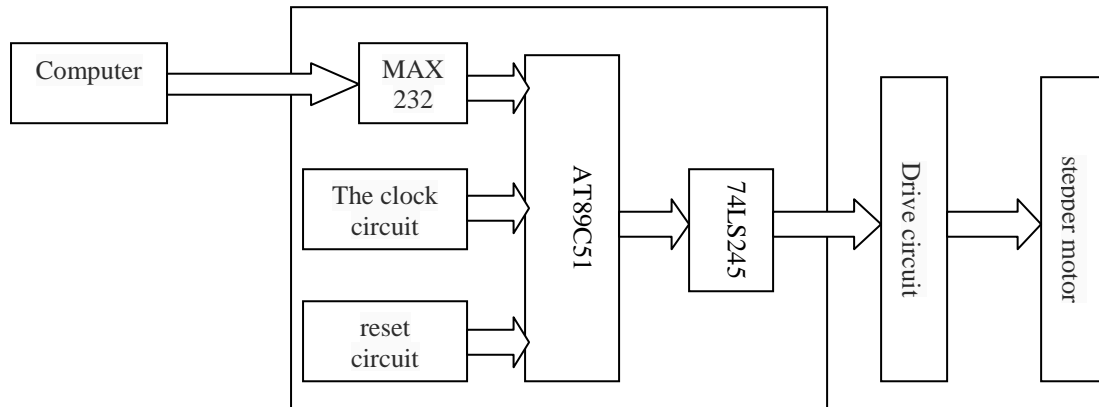
Figure. 2 Stepping motor control system

Motor control system mainly includes the main control MCU module, serial communication module, pulse current amplifier module. Basic process is: had a serial port receiving computer AT89C51 and send the parameters, such as motor speed and positive &negative control word, rotational acceleration, etc.), then calls the single-chip microcomputer control procedures, to the stepper motor through PI mouth constantly sending pulse instruction.
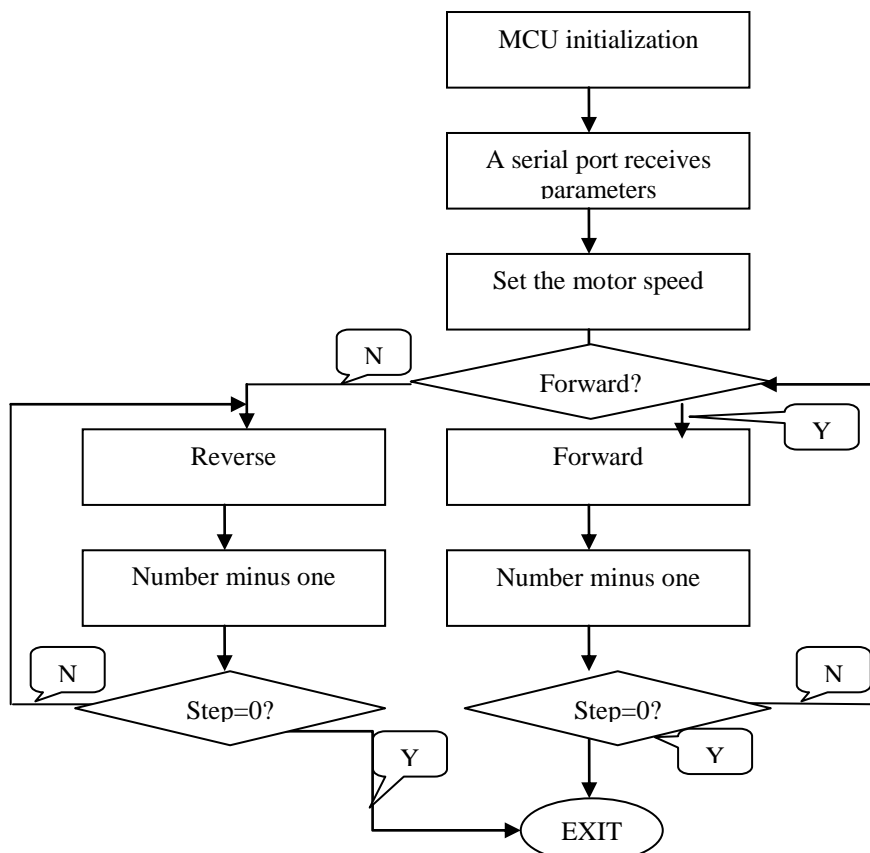
B. *MCU control process*

Figure. 3 The control process

The control process is shown in figure 3.Stepper motor drive circuit based on MCU control pulse, basic single chip microcomputer control including: single chip microcomputer send pulse distribution (change stepper motor current commutation sequence) to control motor (that is, to realize step motor and reversing); MCU send pulse frequency control stepping motor speed; MCU sends the number of pulse control stepping motor rotation Angle.

IV. THE CONTROL SYSTEM SOFTWARE DESIGN

A. A summary of the Labview

Labview is the NI (National Instruments), introduced the virtual instrument development platform, it use icons instead of text code to create the application, has the characteristics of the flow chart of program design language, execution order is decided according to the flow of data between the block diagram, rather than a generic programming language, line by line. When write block diagram program, need to choose different function icon from the function module, and then to line is connected, the data transmission can be realized. Labview with NI company movement control CARDS can provide accurate, high performance for step application solution.

B. Stepping motor control system programming

Labview8.0 is adopted to improve the development of the stepper motor control software, some control procedures front panel as shown in figure 4. Control interface is included in the serial port resource selection and setting of motor parameters. Typically, desktop computers provide resources for two serial ports, we can choose any of a connection to the stepper motor control system, connected to the serial port address and control interface, select the serial port address should be consistent. Motor control method including the choice of direction of rotation, rotation speed and rotation Angle setting .
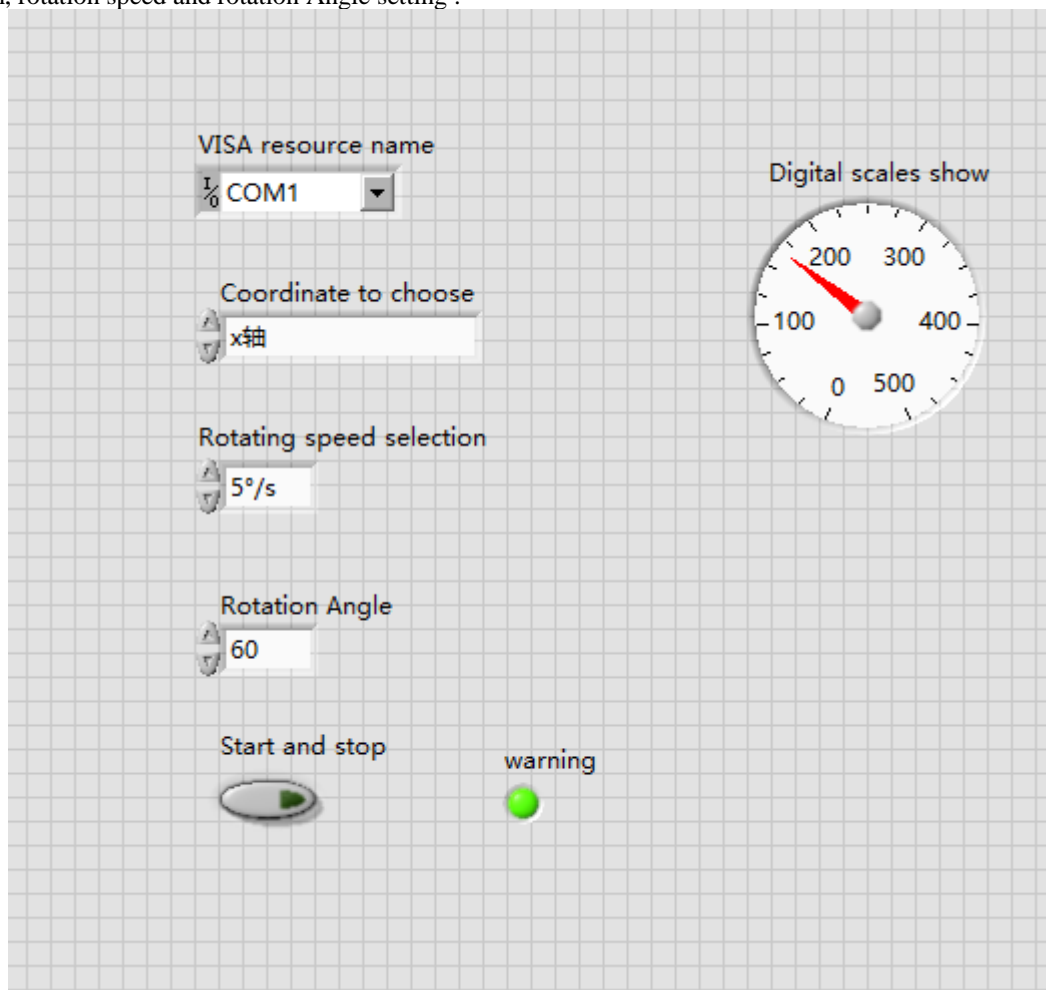

Figure 1.   Part of the control procedures front panel

C. Labview part of the control program

Control program is to use the VISA function to motor control parameters via a serial port to control box of the microcontroller, motor command word format in the program should be from numerical array is converted to ASCII characters as VISA Write Write data. VISA is a Virtual instrument Software Architecture (Virtual Instrumentation Software Architecture). VISA is a general purpose I/O standard, as the control program and data transmission bus layer, and instruments for the application of bus communication channel is established. Part of the control block diagram as shown in figure 5.
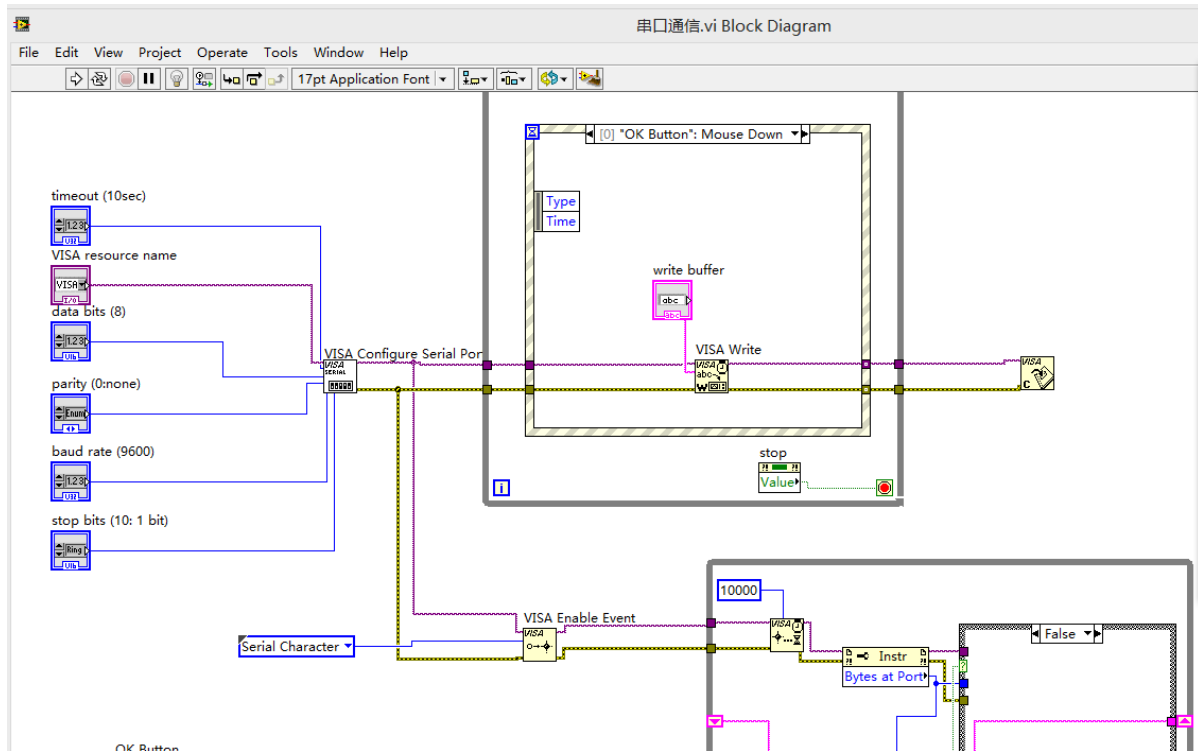
Figure 2. Part of the control block diagram

V. CONCLUSION

Labview as a kind of graphical programming software, is simple in programming and rich library functions, convenient debugging, and many other advantages, using Labview development control program can be easily implemented for stepper motor drive control, and human-computer interaction is strong, friendly interface. Through Labview combined with single chip microcomputer control of the stepper motor, can directly on the Labview to achieve control of the stepper motor speed and Angle. With the traditional single chip microcomputer control or Labview acquisition card control, compared with advantages of low cost, simple programming, convenient control, the system has been used in the actual measurement system.

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